

SUPPLEMENTARY APPENDIX, SEARCHES

Searching for trials investigating the BENEFIT of arthroscopy

Medline (Pubmed)

1. "Menisci, Tibial/surgery"[Mesh]
2. "Menisci, Tibial/injuries"[Mesh]
3. "Degenerative meniscal tear" [TIAB]
4. "Arthroscopic lavage"[TIAB]
5. "Arthroscopic debridement"[TIAB]
6. "arthroscopic meniscectomy"[TIAB]
7. "Arthroscopy"[TIAB] AND "Knee"[TIAB]
8. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7
9. "Randomized" [TIAB]
10. "Randomized controlled trial"[Publication Type]
11. "randomized controlled trials as topic"[Mesh]
12. "Random allocation"[Mesh]
13. "Control group"[TIAB]
14. "Control groups"[Mesh]
15. "Cross-over studies"[TIAB]
16. "Cross-over study"[TIAB]
17. 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16
18. 8 AND 17

Embase

1. Arthroscopic meniscectomy.ti,ab,kw.
2. Arthroscopic debridement.ti,ab,kw.
3. Arthroscopic lavage.ti,ab,kw.
4. Degenerative meniscal tear.ti,ab,kw.
5. knee meniscus/ or meniscus tibial.mp
6. exp knee arthroscopy/
7. 1 or 2 or 3 or 4 or 5 or 6
8. randomized controlled trial/
9. randomized.ti,ab,kw.
10. randomised.ti,ab,kw.
11. Random allocation.mp.
12. randomised.mp.
13. "randomized controlled trial (topic)"/
14. Control group.mp.
15. control group/
16. crossover procedure/

17. 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16

18. 7 and 17

Cochrane Database of registered trial (CENTRAL)

1. MeSH descriptor: [Menisci, Tibial] explode all trees and with qualifier(s): [Injuries - IN, Surgery - SU]
2. MeSH descriptor: [Arthroscopy] explode all trees
3. MeSH descriptor: [Knee] explode all trees
4. 2 and 3
5. Degenerative meniscal tear:ti,ab,kw (Word variations have been searched)
6. Arthroscopic lavage:ti,ab,kw (Word variations have been searched)
7. Arthroscopic debridement:ti,ab,kw (Word variations have been searched)
8. arthroscopic meniscectomy:ti,ab,kw (Word variations have been searched)
9. 1 or 4 or 5 or 6 or 7 or 8

Cumulative Index to Nursing and Allied Health Literature (CINAHL)

1. TI "Degenerative meniscal tear" OR AB "Degenerative meniscal tear"
2. MH "Arthroscopy" OR "arthroscopy"
3. MH "knee" OR AB "knee" OR TI "knee"
4. 2 AND 3
5. MH "Meniscal Injuries" OR AB "meniscal Injuries" OR TI "meniscal Injuries"
6. MH "Menisci, Tibial" OR AB "tibial meniscus" OR TI "tibial meniscus"
7. TI "Arthroscopic lavage" OR AB "Arthroscopic lavage"
8. TI "Arthroscopic debridement" OR AB "Arthroscopic debridement"
9. TI "arthroscopic meniscectomy" OR AB "arthroscopic meniscectomy"
10. 1 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9
11. TI "Randomized" OR AB "Randomized"
12. MH "Randomized Controlled Trials" OR TI "Randomized Controlled Trials" OR AB "Randomized Controlled Trials"
13. MH "Random Assignment" OR AB "Random Assignment" OR TI "Random Assignment"
14. AB "Random Allocation" OR TI "Random Allocation"
15. (MH "Control Group") OR (AB "Control Group") OR (TI "Control Group")
16. (MH "Crossover Design") AND (AB "Crossover Design") AND (TI "Crossover Design")
17. 11 OR 12 OR 13 OR 14 OR 15 OR 16
18. 10 AND 17

Web of Science (Thomson Reuter)

1. arthroscopy AND knee
2. arthroscopic meniscectomy

3. arthroscopic debridement
4. arthroscopic lavage
5. degenerative meniscal tear
6. menisci, tibial AND surgery
7. menisci, tibial AND injury
8. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7
9. randomized
10. randomised
11. random allocation
12. control group
13. cross-over stud*
14. randomized controlled trial
15. 9 OR 10 OR 11 OR 12 OR 13 OR 14
16. 8 AND 15

Searching for studies investigating potential HARMS of arthroscopy

Medline (Pubmed)

19. "Menisci, Tibial/surgery"[Mesh]
20. "Menisci, Tibial/injuries"[Mesh]
21. "Degenerative meniscal tear" [TIAB]
22. "Arthroscopic lavage"[TIAB]
23. "Arthroscopic debridement"[TIAB]
24. "arthroscopic meniscectomy"[TIAB]
25. Arthroscopy[TIAB] AND Knee[TIAB]
26. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7
27. "adverse events"[Title/Abstract]
28. "side effects" [Title/Abstract]
29. "adverse effects" [Title/Abstract]
30. complication*[Title/Abstract]
31. "adverse effects" [Subheading])
32. 9 OR 10 OR 11 OR 12 OR 13
33. 8 AND 14

Embase

1. Arthroscopic meniscectomy.ti,ab,kw.
2. Arthroscopic debridement.ti,ab,kw.
3. Arthroscopic lavage.ti,ab,kw.
4. Degenerative meniscal tear.ti,ab,kw.
5. knee meniscus/ or meniscus tibial.mp

6. exp knee arthroscopy/
7. 1 or 2 or 3 or 4 or 5 or 6
8. adverse events.mp.
9. side effects.mp.
10. adverse effects.mp.
11. complications.mp.
12. 8 or 9 or 10 or 11 or 12
13. 7 and 12

Cochrane Database of registered trial (CENTRAL)

1. arthroscopy:ti,ab,kw (Word variations have been searched)
2. MeSH descriptor: [Arthroscopy] explode all trees
3. knee:ti,ab,kw (Word variations have been searched)
4. MeSH descriptor: [Knee] this term only
5. 1 or 2
6. 3 or 4
7. 5 and 6
8. arthroscopic debridement:ti,ab,kw (Word variations have been searched)
9. arthroscopic meniscectomy:ti,ab,kw (Word variations have been searched)
10. arthroscopic lavage:ti,ab,kw (Word variations have been searched)
11. Degenerative meniscal tear:ti,ab,kw (Word variations have been searched)
12. MeSH descriptor: [Menisci, Tibial] explode all trees
13. MeSH descriptor: [Menisci, Tibial] explode all trees and with qualifier(s): [Injuries - IN]
14. 8 or 9 or 10 or 11 or 12 or 13
15. side effect:ti,ab,kw (Word variations have been searched)
16. adverse effect:ti,ab,kw (Word variations have been searched)
17. adverse events:ti,ab,kw (Word variations have been searched)
18. "complication":ti,ab,kw (Word variations have been searched)
19. 15 or 16 or 17 or 18
20. 7 or 14
21. 19 and 20
22. MeSH descriptor: [Arthroscopy] explode all trees and with qualifier(s): [Adverse effects - AE]
23. 21 or 22

Cumulative Index to Nursing and Allied Health Literature (CINAHL)

1. AB arthroscopy OR TI arthroscopy
2. AB knee OR TI knee
3. 1 and 2
4. MH "Surgical Debridement"

5. MH "Mechanical Debridement"
6. TI "arthroscopic debridement" OR AB "arthroscopic debridement"
7. AB "Meniscectomy" OR TI "Meniscectomy"
8. TI "Arthroscopic lavage" OR AB "Arthroscopic lavage"
9. TI "Degenerative meniscal tear" OR AB "Degenerative meniscal tear" OR
10. TI "Menisci, Tibial" OR AB "Menisci, Tibial" OR MH "Menisci, Tibial"
11. 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
12. MH "Postoperative Complications+"
13. TI complications OR AB complications
14. TI "adverse effects" OR AB "adverse effects"
15. TI "adverse events" OR AB "adverse events"
16. TI "side effects" OR AB "side effects"
17. 12 or 13 or 14 or 15 or 16
18. 11 and 17
19. (MH "Arthroscopy/AE" OR MH "Meniscectomy/AE")
20. 18 or 19

Web of Science (Thomson Reuter)

1. arthroscopy AND knee
2. arthroscopic meniscectomy
3. arthroscopic debridement
4. arthroscopic lavage
5. degenerative meniscal tear
6. menisci, tibial AND surgery
7. menisci, tibial AND injury
8. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7
9. adverse events
10. adverse effects
11. side effects
12. complication
13. 9 OR 10 OR 11 OR 12
14. 8 AND 13

SUPPLEMENTARY APPENDIX, FIGURES

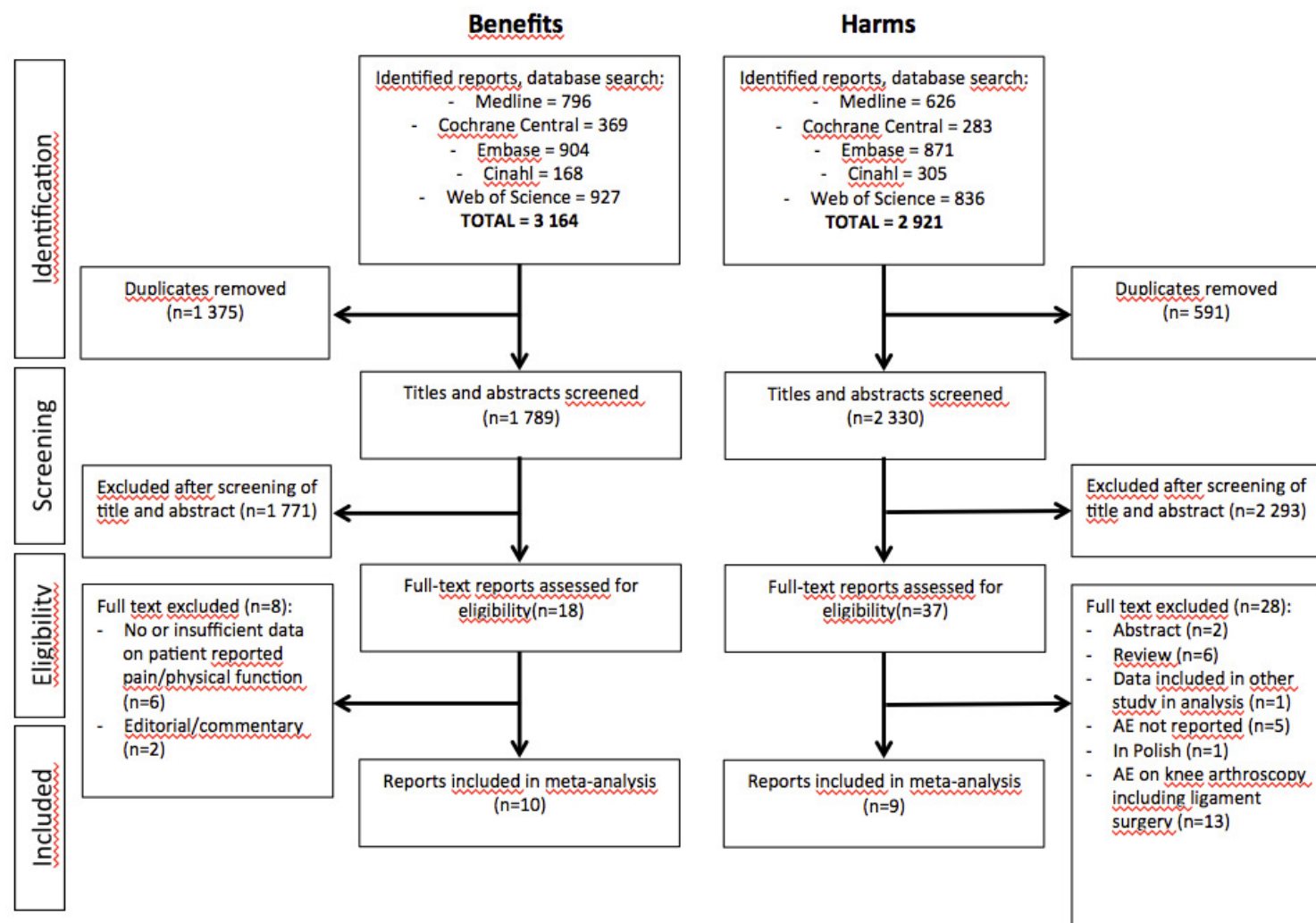


Figure A: Flow chart of study selection for the analysis on benefits and harms, respectively.

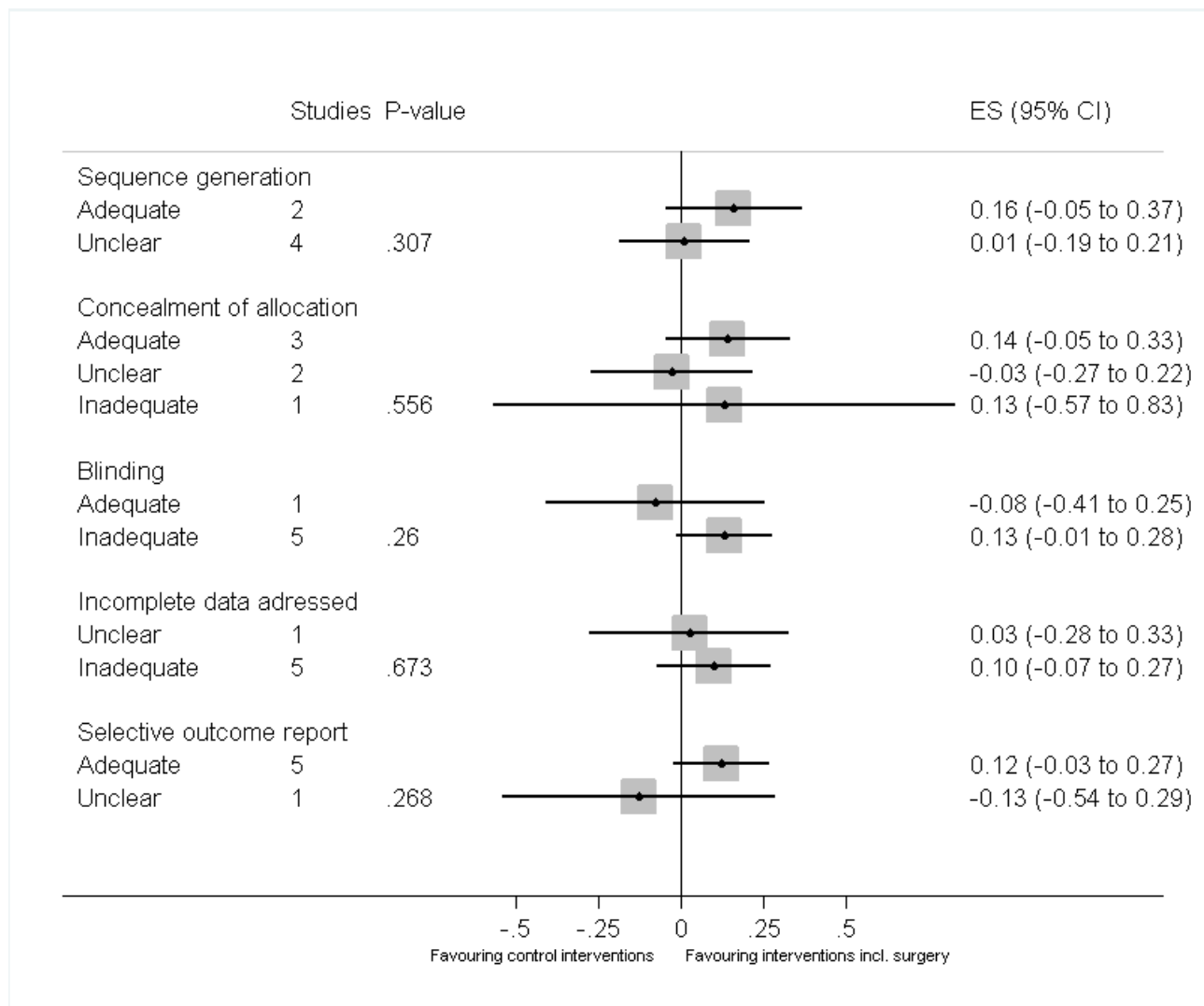


Figure B: Evaluation of risk of bias in the primary analysis on physical function. *P*-value indicates difference between studies dependent on risk of bias scoring (i.e. adequate, inadequate and unclear).

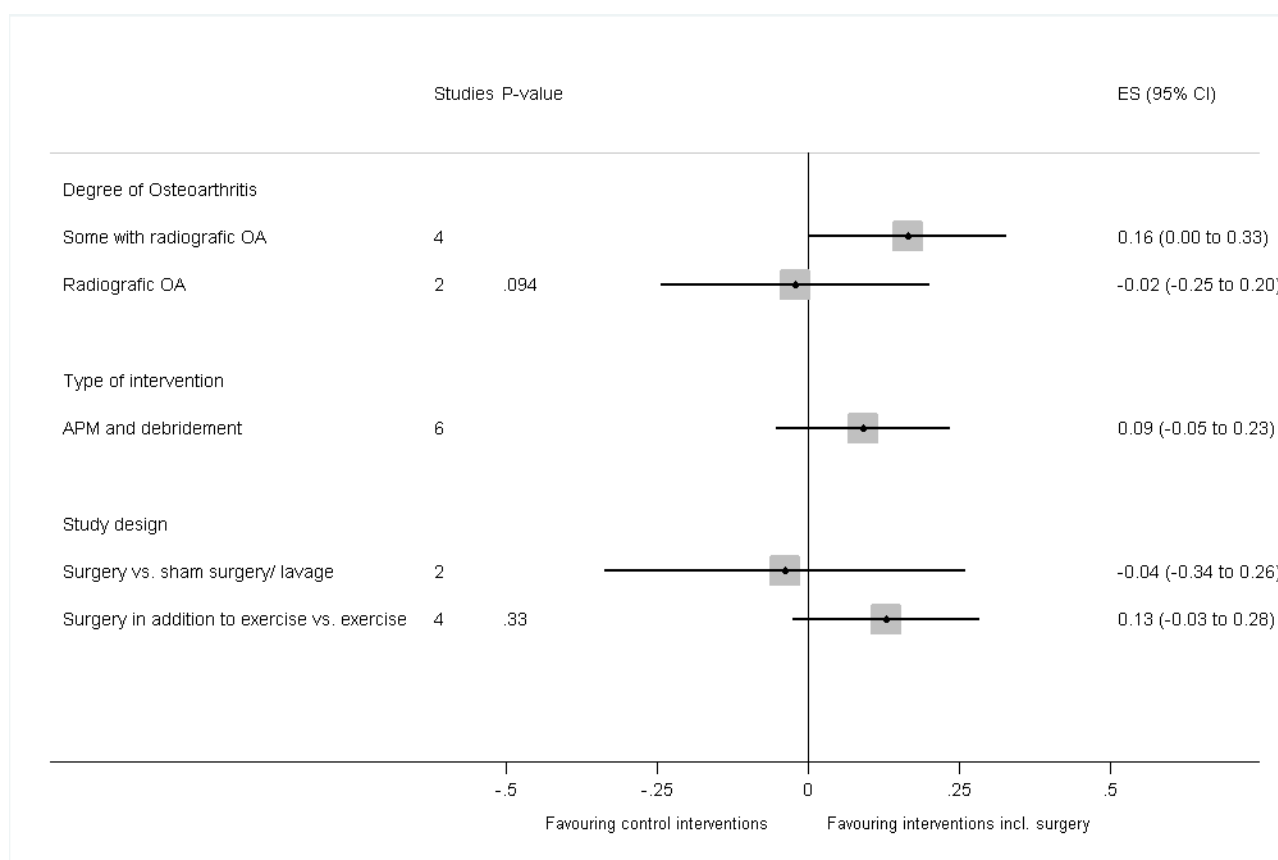


Figure C: Subgroup analysis on the primary analysis on physical function stratified by study population knee OA status, surgery type (i.e. arthroscopic partial meniscectomy (APM) without or with concomitant debridement) and study design. *P*-value indicates difference between the different sub-groups.

SUPPLEMENTARY APPENDIX, TABLES

Table A: Summary of included studies investigating the effect of arthroscopic partial meniscectomy (APM) and debridement (including APM)									
	Intervention group (n)	Control group (n)	Age	BMI	% female	VAS pain (0-100mm)	Pain/disability outcome	Follow-up time primary outcome	Radio-graphic OA
Chang (1993)	Debridement, including APM (19)	Lavage (15)	62.8	-	72 %	63	AIMS pain / AIMS physical function	12 months	Some
Moseley (2002)	Debridement, including APM (59)	Sham surgery (60) and lavage (61)	52.2	-	7.2 %	62	SF-36 pain / SF-36 physical function	24 months	All
Herrlin (2007 & 2013)	APM, including limited debridement + supervised exercise (47)	Supervised exercise (49)	55.0	27.5	40 %	40	KOOS pain / KOOS ADL	6 months	Some
Kirkley (2008)	Debridement, and/or APM + physical and medical therapy (94)	Physical and medical therapy (94)	59.6	30.9	63%	45	WOMAC pain / WOMAC physical function	24 months	All
Østerås (2012)	APM (8)	Medical exercise therapy (9)	49.7	-	76%	36	VAS pain at rest / -	3 months	Some
Katz (2013)	APM, including minimal debridement + physiotherapy (174)	Physiotherapy (177)	58.4	30.0	57%	53	KOOS pain / WOMAC physical function	6 months	Some
Yim (2013)	APM, including limited debridement + home exercise (54)	Supervised exercise + home exercise (54)	56.3	25.7	79%	50	VAS pain	24 months	None
Sihvonen	APM (70)	Sham surgery (76)	52.0	27.4	39%	60	VAS pain after	12 months	None

(2013)

Gauffin (2014)	APM + un-supervised exercise (75)	un-supervised exercise (75)	54.0	-	27%	44	exercise KOOS pain / KOOS ADL	12 months	Some
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AIMS = Arthritis Impact Measurement Scales, APM = arthroscopic partial meniscectomy, BMI = body mass index (kg/m^2), KOOS = Knee Injury and Osteoarthritis Outcome Score, OA = osteoarthritis, SF-36 = The Short Form (36) Health Survey, VAS = Visual Analogue Scale, WOMAC = Western Ontario and McMaster Osteoarthritis Index

Table B: Summary of findings - Arthroscopic surgery for the degenerative knee

Patient: middle-aged and older patients with knee pain and degenerative knee disease

Settings: outpatient

Intervention: knee arthroscopy involving arthroscopic partial meniscectomy with or without concomitant debridement

Comparison: non-surgical treatments (usual care, placebo/sham surgery, exercise therapy)

Outcomes	Illustrative comparative effect (95% CI)		Effect size (95% CI)	Number of Participants (studies)	Quality of the evidence (GRADE)	
	Assumed effect of control treatment	Corresponding effect of knee arthroscopic surgery				
Pain on VAS scale (0-100 mm)	40.8 % improvement ¹	2.4 mm change [0.4; 4.3] ²	SMD 0.14 (0.03; 0.26)	1270 (9 studies)	++++ high	NNT: 16 [9; 91] ⁵
Various pain scales		Difference 4.1% [0.7% to 7.4%] ³				
Physical function on a VAS scale (0-100 mm)	26.0 % improvement ¹	1.5 mm change [-0.9; 4.0] ²	SMD 0.09 (-0.05; 0.24)	999 (6 studies)	++++ high	
Various disability scales		Difference 3.5% [-2.1% to 9.1%] ³				
Adverse events		Risk in 1000 patients /procedures				
Deep-vein thrombosis		4.13 [1.78; 9.60]			low ++oo ⁴	
Pulmonary embolism		1.45 [0.59; 3.54]			++oo ⁴	

Venous embolism	5.68 [2.96; 10.88]	++oo ⁴
Infection	2.11 [0.80; 5.56]	++oo ⁴
Death	0.09 [0.04; 23.92]	++oo ⁴

¹⁾ Assumed control response 40.8% for pain and 26.0% for physical function. Tubach et al. Annals of Rheumatic Disease 2005; 64:29-33.

²⁾ Estimated from using the approach in Tubach et al. Annals of Rheumatic Disease 2005; 64:34-7.

³⁾ Estimated from SMD into percent improvement according to Bliddal & Christensen. Expert Opin 2009; 10(11)1793-1804

⁴⁾ Downgraded (2 levels) due to substantial heterogeneity and risk of bias

⁵⁾ NNT is estimated from OR. SMD is transformed to OR using the equation from Chinn in Cochrane Handbook for Systematic Reviews

Table C: Assessment of risk of bias of included studies on benefits of arthroscopic surgery.

	Sequence generation	Allocation concealment	Blinding	Incomplete data addressed	Selective outcome reporting	Other bias
Chang (1993)	☺	☹	☹	☹	☺	☺
Moseley (2002)	☺	☺	☺	☹	☺	☺
Herrlin (2007)	☺	☺	☹	☹	☺	☺
Kirkley (2008)	☺	☺	☹	☺	☺	☺
Østerås (2012)	☺	☺	☹	☺	☺	☺
Katz (2013)	☺	☺	☹	☹	☺	☺
Yim (2013)	☺	☹	☹	☹	☺	☺
Sihvonen (2013)	☺	☺	☺	☺	☺	☺
Gauffin (2014)	☺	☺	☹	☹	☺	☺

☺ = adequate, ☹ = inadequate, ☺ = unclear

Table D: Summary of included studies investigating symptomatic harms in patients undergoing arthroscopic meniscus surgery with or without debridement.

	Study design	Mode of reporting	Study size (n)	Collection period (days)	Adverse events extracted	Number of events (events per 1000)
Hetsroni (2011)	Retrospective register study	Per procedure	304 160	90	PE	89 (0.29)
Jameson (2011)	Retrospective register study	Per patient	106 793	30 90	DVT	124 (1.16)
					PE	85 (0.80)
					VTE	202 (1.89)
					Death	23 (0.22)
					Readmission	477 (4.47)
					Any wound complication	116 (1.09)
					Unplanned re-operation	321 (3.01)
Hame (2012)	Retrospective register study	Per patient	314 578	90	DVT	2 507 (7.97)
					PE	982 (3.12)
					VTE*	3 489 (11.1)
					Infection	1 107 (3.52)
Maletis (2012)	Retrospective register study	Per patient	10 783	90	DVT	34 (3.15)
					PE	22 (2.04)
					VTE	54 (5.01)
Katz (2013)	RCT	Per patient	174	365	DVT	2 (11.5)
					PE	1 (5.75)
					VTE*	3 (17.2)
					Infection	0
					Death	1 (5.75)
Sihvonen	RCT	Per patient	70	365	DVT	0

(2013)					PE	0
					VTE	0
					Infection	1 (14.3)
					Death	0
Yeranosian (2013)	Retrospective register study	Per procedure	492 452	30	Infection (requiring re-operation)	661 (1.34)
Bohensky (2014)	Retrospective register study	Per procedure	139 130	30	VTE	488 (3.51)
					Infection and cellulitis	113 (0.81)
					Any joint complications (hemarthrosis, effusion, synovitis, synovial fistula)	152 (1.09)
Hoppener (2006)	Prospective study	Per patient	335	60	DVT	2 (5.97)
					PE	1 (2.99)
					VTE*	3 (8.96)

Table E: Assessment of risk of bias of included studies on harms.

	Intervention description	Type of adverse events reported	Loss to follow-up
Hoppener (2006)	😊	😞	😊
Hetsroni (2011)	😊	😞	😐
Jameson (2011)	😊	😊	😐
Hame (2012)	😊	😞	😐
Maletis (2012)	😊	😞	😊
Katz (2013)	😊	😊	😊
Sihvonen (2013)	😊	😞	😊
Yeranosian (2013)	😊	😞	😐
Bohensky (2014)	😊	😞	😐
😊 = adequate, 😞= inadequate, 😐 = unclear			